JULY 1981

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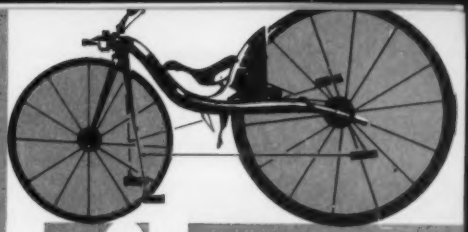


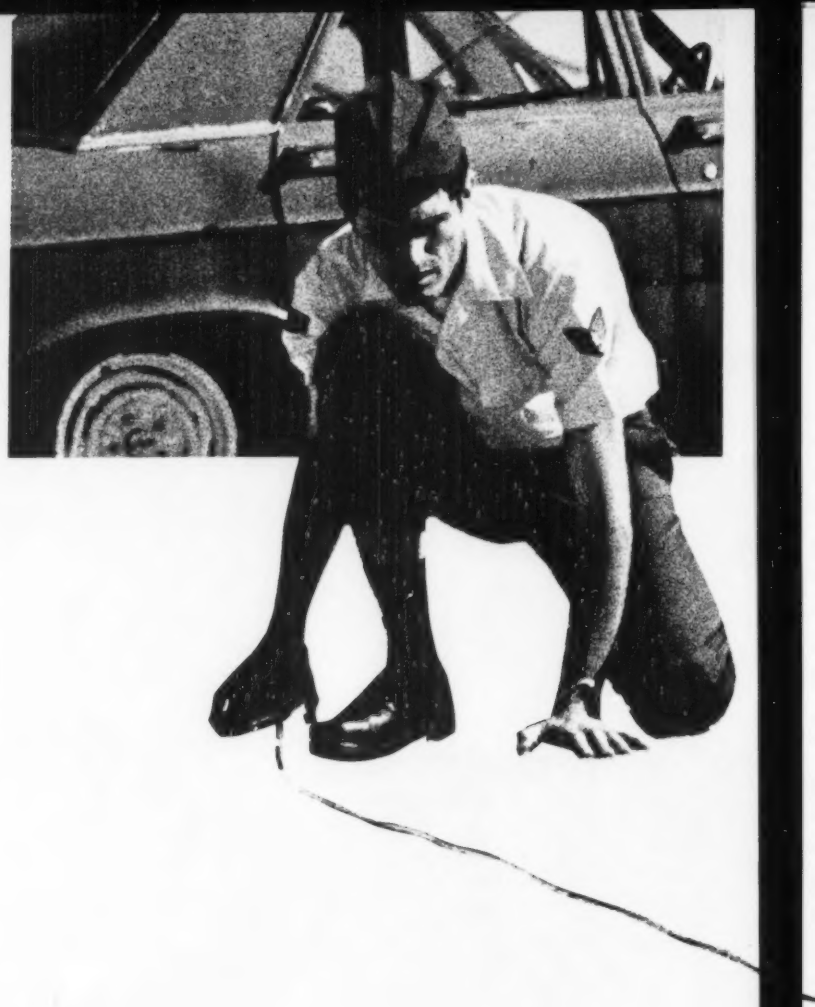
bikes

come of age

bikes

safety at 55 mph

- Back to School
- Double Tech
- The Backyard Mechanic
- Car Check Quiz



The black paint on the pavement marks the "probable point of impact" at this mock accident site.

Back to School

$$F = \frac{S^2}{30d} \quad S = 5.5\sqrt{d(F \pm f)} \quad Sc = \sqrt{Sa^2 + Sb^2}$$

These, of course, are the ever-popular equations for coefficient of friction, minimum speed and combined speed. Or, spelled out: Drag factor equals the speed squared divided by 30 times the distance. Minimum speed equals 5.5 times the square root of the drag factor plus or minus the grade. Combined speed equals the square root of the speed on surface a squared plus the speed on surface b squared. But of course you knew that.

Or at least you did if you're a trained traffic accident investigator. Those formulas are just a small example of the complexity of the field of accident investigation, and that complexity is a prime reason for the existence of the Traffic Management and Accident Investigation Course at Lackland AFB, Texas.

The course is an advanced course, designed to supplement what the security policemen get in tech school. As one of the course's instructors put it, "Traffic accident investigation is so technical that you can't go on just common sense. The people need the training to be good accident investigators."

What is contained in that training is basic traffic law, the procedures and policy of accident investigation, and information on how to fight the causes of accidents (traffic management). As another instructor said,

An accident investigation course at Lackland AFB teaches military policemen the hows and whys of automobile accidents

"Our purpose isn't to teach how to give tickets. It's to explain how and why an accident happens."

DRIVER wants to give the readers some idea of the work being done to prepare the country's military policemen to become more effective investigators.

Off to school: The course is a joint-service endeavor at the U.S. Air Force Security Police Academy at Lackland. It is a 17-day course, offered an average of 18 times a year, which trains an annual 325 to 350 security policemen of all services in the techniques of modern accident investigation. There have been 1,400 graduates of the course since 1977.

When the course was established in 1973 it was decided it was cheaper to do advanced training at a military installation rather than sending the students to a civilian school such as the Traffic Institute at Northwestern University. Also, a military course could stress military accident investigation needs over civilian situations. (Northwestern has a special Armed Forces course, but it deals with management and not investigation.) It was further decided that it was cheaper and more efficient to have only one course for all services, rather than duplicating the effort. The USAF Security Police Academy at Lackland was a logical place for it.

The short duration of the course provides a tough schedule for the students, but it is worth it. The Community College of the Air Force offers five semester hours of credit for the course. In contrast, the comparable courses at Northwestern's Traffic Institute offer only continuing education units for successful completion, which are not applicable toward a degree.

The schedule is tight not only for the students but also for the instructors. The classes usually overlap by several days, with one class finishing up while another begins the difficult 3½ weeks. The five-man faculty is kept busy.

The instructors freely admit the toughness of the course. Army Capt. Mark A. Mitzel, the course chief, said, "We *mean* it to be difficult. We have an obligation to the students — and to the service and the general public — to train them well."

This training includes both classroom instruction and field training. Their field training consists of trips to a site on the base where they perform precise measurements of mock acci-

continued

DRIVER

THE
TRAFFIC SAFETY MAGAZINE
FOR THE MILITARY DRIVER

DEPARTMENT OF THE AIR FORCE
HQ AIR FORCE INSPECTION AND SAFETY CENTER
Norton Air Force Base, California 92409

HON VERNE ORR
Secretary of the Air Force

Lt Gen HOWARD W. LEAF
The Inspector General, USAF

Maj Gen HARRY FALLS, Jr.
Commander
Air Force Inspection and Safety Center

Brig Gen LELAND K. LUKENS
Director
Aerospace Safety USAF

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Dr. FRANCIS S. McGLADE
Director of Safety
United States Army

RADM T.C. STEELE JR.
Commander
Naval Safety Center

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JUL

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COL. WARREN L. BUSCH
Chief, Safety Education Division

VIRGINIA HENDRIX
Editor

TSgt RON LATHROP
Technical Editor

JERI ROOD
Feature Editor

ALICE MILKEY
Editorial Assistant

DON KELLEHER
Art Director

LORRAINE HAMBLEN
Staff Artist

CLIFF MUNKACSY
Staff Photographer

THE EDITOR SPEAKS

DOUBLE CLUTCH

SHOULD THERE BY A LAW?

Now that air bags are a dead issue — even Mercedes-Benz has withdrawn them as a U.S. option, although it will continue to offer them in its own German market — we may see our government stepping up its seat-belt propaganda. (*Propaganda* in its classical meaning of spreading true information for the purpose of helping a cause or a person.)

Federal highway safety chief Ray Peck has proposed a widespread buckle-up campaign, with spots on TV and radio as well as brochures. Peck wants to shock drivers with the horror of the enormous forces unleashed in a car crash.

As recently as six months ago, DRIVER hadn't heard of any safety expert, in or out of government, who believed a seat-belt law was possible in the United States. But now that the air bag is about to be forgotten, we hear seat-belt laws being talked about on every side. Around here, we've been wondering if Americans would obey mandatory belt laws, or just get cranky about them the way many of our cyclists get cranky over helmet laws.

If you are one of those who buckles up faithfully, you know it is nothing more than a habit. Once the habit is established, you will not be comfortable unbelted in a moving vehicle. A friend took a three-hour bus trip to shop in a Mexican border town and told us later she squirmed about and felt ill-at-ease the whole trip. It finally occurred to her it was because she wasn't buckled up. The bus of course had no seat belts.

We would like to hear your opinions about mandatory belt laws. Do you think they would help Americans get the seat-belt habit? Would you resent the state or nation telling you what you had to do in your own car? Should we do as the Germans and rule that unbelted motorists injured in accidents are presumed guilty of negligence? Please drop us a line and let us know what you think.

back to school

continued

Captain Mark Mitzel, course chief, gives the students some advice on the proper angle to take photos for an accident report.

(above, below)
Dummies play the part of pedestrian accident victims at the mock accident site.

dents which they use to compute speeds for determining the supposed cause of the accidents.

DRIVER visited the course during one of the overlap periods. One class had just started and another was in its final four days. The beginning class was involved with classroom teaching on military and civilian traffic law. The "senior" class was receiving instruction on a variety of subjects including traffic management, speed computations, and alcohol testing devices. They also spent part of one day taking measurements at the mock accident site.

Definitions: A look inside the classroom will show the depth of the instruction. The beginning class of 19 NCOs had started only a couple of days before. They sat at their tables, each surrounded by copies of the Uniform Vehicle Code and Model Traffic Ordinance, Traffic Laws Annotated, and a collection of texts on law, accident investigation, and the legal aspects of radar and chemical testing.

The lecturer, U.S. Marine Corps Gunnery Sgt. Isaac L. Goodman, gave definitions used in law for "driving," "operating," and "having actual physical control" of a car. He explained that "driving" involves motion of the car. "Operating" means having control of those things

continued

continued

that move the car — the wheel, gas pedal and brake — but does not necessarily involve motion. "Having actual physical control" means merely having the *ability* to control the car. It does not necessarily involve being inside the car.

For many of us, these distinctions are minor, perhaps even trivial. But for the person who may be called upon to testify in court they are very important.

The accident investigator must be knowledgeable of the traffic laws. To this end, about one-third of the 128 academic hours of the course are devoted to traffic laws and enforcement, both military and civilian.

An interesting part of this section is the study of "selective enforcement." This is the law enforcement method that is commonly misunderstood as a "quota." The theory is that enforcement should be directed at those violations that cause traffic accidents, and in proportion to their occurrence. The usual ratio is ten tickets for every accident — if speeding, for instance, causes three accidents in a month, there should be 30 speeding tickets issued to make an acceptable level of enforcement.

Also in the section on law enforcement, the students are instructed in the operation of radar and devices used to test drivers for the consumption of alcohol, but they are not officially certified in the use of these machines.

Investigation: Once the basics of traffic law and enforcement are given to the students, the instructors can move to the meat of the course, automobile accident investigation.

The students are taught the proper way to investigate an accident, both through interviewing of witnesses and through observations and measurements at the accident site. Accuracy and carefulness are stressed.

In speaking of interviewing witnesses, Captain Mitzel said, "Ninety-nine percent of the witnesses don't *see* the accident. They hear the sound of the accident, and then turn to look. The investigator must be able to differentiate what the witness saw from what his biases are.

"I tell the students to look at accident investigation like a jigsaw puzzle," he continued. "Gather the prices and put them together. I tell them 'Don't draw *any* conclusions (before you get all the facts). If you do, you'll look for facts that support that conclusion, and eliminate the others.' "

This is the reason for some of the cautious terms used in accident investigation. One is "probable point of impact" or "PPI." The facts that they gather lead the investigators to believe a certain point is the *most likely* point of the collision. Another term is "minimum speed." The vehicle skidmarks and other data are used in their mathematical formulas to give the speed with which the vehicle was traveling. In reality, however, the formulas give only an estimate, the *slowest* the vehicle could have been moving.

The students are also taught to look for things that an untrained observer would miss. An interesting example is the method of examining broken headlights to discover if they were on before the collision. If a headlight was on, the filament would have been hot and would have stretched before it broke. If it was off, the filament would simply have broken without stretching.

There is even a section on how to write a good accident report. In this, students learn to use the basic journalistic "five Ws" — who, what, when, where and why — in their writing. The instructors teach the students to use good grammar and to include all the pertinent information in the report.

"If you can't put the information down on paper the way it happened, completely, concisely and clearly, we can't use it," Captain Mitzel tells the students.

At the scene: Although the majority of the course is classroom work, the students are taken twice for some field training to a concrete pad on the base that is set up with mock accidents. The first time out, they are given the task of investigating a simple two-car collision in an intersection. Later in the course they are taken again to the scene to investigate five other mock accidents.

Each time, they do field sketches of the accidents, complete with all roads and vehicles involved and pertinent signs. After this, they take a series of measurements of the scene from various points. They are taught two methods for this. Triangulation, the older method, involves measurement of angles from observation points that are a known distance apart. The newer, simpler method is the "grid method," measurement of the actual distances to the accident vehicles from several fixed reference points. Finally, they take photographs of the accidents with instant cameras.

"blow up this balloon"

Students at Lackland's accident investigation course are given instructions on how to operate alcohol testing devices. These include both the simple qualitative tests and the machines used for quantitative tests.

Qualitative testing shows only if alcohol is present. It usually involves the suspect blowing into a balloon which is then attached to a container of chemicals that change colors if alcohol is present.

Quantitative testing shows the precise amount of alcohol in the suspect. The accident investigation course has two machines of this type, the Breathalyzer and the Intoxilyzer.

The Breathalyzer is the more common (and cheaper) of the two. It takes more calibration and set-up time, and it also has the disadvantage of being subject to operator tampering. The Breathalyzer uses a liquid chemical that changes color when exposed to alcohol fumes. The amount of the color change determines the amount of alcohol in the suspect's system.

The Intoxilyzer is a more complex, but easier to use, machine. It is more expensive and is not subject to tampering by the operator. It works on the principle of infra-red absorption — the amount of infra-red radiation absorbed into the breath sample determines the level of intoxication of the suspect.

With these tools, they can go back to the classroom and draw accurate, detailed scale diagrams of the accident scene. The diagrams contain all the data the investigators will need to do their computations on the speed of the vehicles. The drawings will contain the locations of the vehicles, probable points of impact, length of skidmarks, distances the vehicles traveled, etc. Diagramming of the accident scene is a very important part of accident investigation, and it is given a full 19 hours of instruction.

In diagramming, the students make use of the Traffic Template and Calculator, a common tool used by both military and civilian accident investigators. Copyrighted by Northwestern University, the template is a clear plastic overlay with stencils and measurements used in drawings. The calculator portion of the template can aid the investigator with his calculations of speed and even steepness of road grades.

The computations necessary for determining the speed of accident vehicles are done with various formulas, a few of which were at the beginning of this article.

Accident management: Once the computations have been made, the investigator can move on to accident management. This is the determination of how and why the accident happened. The students are taught to ask "Where did safe operations break down?"

To answer this, they look at the "operational factors," those things over which the driver has some control, and the "conditional factors," those things over which the driver has no control. The operational factors that can cause an accident are driver mistakes in either trip preparation (such as overloading the vehicle), driving strategy (bad driving) or evasive action (such as not swerving in time).

The conditional factors are the "non-ideal" characteristics or limitations of the driver (such as confusion or illness), the vehicle (perhaps inadequate brakes or a tire failure) or the road (such as rough surface; this classification also includes environmental factors like weather.)

continued

Students work in teams, some taking measurements while others make note of the distances.

Measurements of curves in the road are tricky but vital. They enable investigators to compute the "critical speed" of the curve, that speed at which the driver would lose control of the vehicle.

(below)
The measurements, a field sketch of the accident, and the photographs make up the information the investigator needs to make his computations, and to decide on the probable fault in the accident.

(far left)
PSgt Kenneth Robinson was a criminal investigator before he came to the Traffic Management and Accident Investigation Course.

(near left)
TSgt Billy Gibson, one of the course's five instructors, has been in traffic accident investigation his entire Air Force career.

(below)
GySgt Isaac Goodman is well qualified to lecture on evidence. He is a government-certified expert witness in the area of accident investigation.

the students speak

The students come to the Traffic Management and Accident Investigation Course for only 17 days, but when they leave they have a lot of new information. They feel their ability to do their job has been considerably enhanced.

DRIVER asked a few of them "What was the most valuable part of the course for you?"

SSgt Kenneth R. Cole, Elmendorf AFB, Alaska, said, "The whole course is valuable. At first it looked like they were teaching things not related to traffic accident investigation, things like the definitions of 'road' and 'highway.' But as we went along, everything started to fall into place. If they took anything out, it'd hurt the course." He also got an unexpected side benefit: "I even learned algebra."

SrA Jose M. J. Fuentes, Sheppard AFB, Texas, got the most out of the portions on traffic law, diagramming, and speed formulas. "I'm interested in more advanced courses," he said. "I was glad for the opportunity to come to this one."

SSgt Arthur J. LeBrane supervises accident investigators at England AFB, La. "I can now give my people a clear idea of how to investigate accidents," he said. He valued the step-by-step procedures for accident investigation and the instruction on how to set up standards for the base to comply with the traffic safety programs.

SSgt Richard W. Ariff, Holloman AFB, N.M., was most interested in "the legal aspects of traffic accident investigation — what is and is not admissible, and what should go into the accident investigation package to go to the commander of the individual at fault."

PFC Mark A. Stackpoole was on his way to a new assignment at Ft. Carson,

continued

There must be a breakdown in at least one operational factor *and* one conditional factor in order for an accident to occur. The students are cautioned not to stress one factor over another, because the accident is usually caused by a combination of factors. Further, the elimination of just one of the factors would have averted the accident.

Traffic management: Once the reason for the accident is determined, the accident investigator's job is not over.

"We are not interested in just finding fault," Captain Mitzel said. "Our job is to get the facts, determine the causes, and then eliminate or reduce those causes."

This is traffic management, which can be broken up into the "three Es" — enforcement, engineering and education, the methods used to fight the accident causes.

Once the cause of the accident is known, the specific "E" indicated can be used. For example, let's say a certain area on base is the scene of frequent accidents. If the cause is determined to be a confusing sign or faint street markings, then the answer is probably engineering, the change of the sign or repainting the street markings.

If the cause is drunk drivers leaving a nearby NCO or officer's club, then increased enforcement might be the answer — more patrols by the security police and more tickets.

If the cause of the accidents is found to be some error of the drivers, then the correct response might be a campaign to educate the on-base motorists about that error.

Of the three, Captain Mitzel said education is the most important, because it enables managers to prevent accidents by getting the drivers to voluntarily comply with the traffic rules. DRIVER feels the same way.

Behind the scenes: We have gone into some detail to tell you about some very effective military training. However, our look at the Traffic Management and Accident Investigation Course should not omit the men who make this joint-service effort work — the individual instructors.

The teaching staff has varied backgrounds, as well as different uniforms. Captain Mitzel, the course chief, was in the nuclear weapons security field before being assigned to the accident investigation course. Sergeant Goodman was an accident investigator and military police platoon sergeant. Air Force TSgt. Rufus E. Mincey II was an instructor in other courses at the USAF Security Police Academy. Air Force TSgt. Billy R. Gibson had 10 years in traffic accident investigation. Army Platoon Sgt. Kenneth A. Robinson was a criminal investigator.

Sergeant Gibson is finishing up work on a degree in education from Southwest Texas University. Both he and Sergeant Mincey are official hostage negotiators for Lackland AFB.

Sergeant Robinson is taking a course to be commissioned as a peace officer for the Federal court house at San Antonio. A devoted motorcyclist, he rides an average of 20,000 miles a year.

The newest member of the staff, Sergeant Robinson had not begun teaching in the course when DRIVER visited Lackland, but he was already enthusiastic about it.

"This course is hard and challenging," he said. "We don't push people through."

Captain Mitzel agreed. "It's the difference between something being earned or given to them," he said. "They earn it here."

"You have to have the 'smarts' and the practical experience to be a security policeman," said Sergeant Robinson. He voiced a concern about the need for that experience. "Unless they are used in that capacity (accident investigation), they will never become proficient."

What course? Although the course is well-respected by the professionals in the accident investigation field and well-received by the students, the staff says its existence is not widely-known. Even one of the instructors, Sergeant Mincey, was not aware of it until he was stationed at Lackland.

They feel this is one reason they get so few supervisors in the classes. The course is open to E-3s through O-3s, and civilians as well, but they get officers and civilians only rarely, and very few E-7s through E-9s. The average grade of the students is E-4.

"The E-7 is the backbone of the traffic section. He's the head of the group," said Sergeant Robinson. "But unfortunately we don't get many E-7s."

The instructors fear the experience of many supervisors may be from as far back as the 1940s, and they feel those in charge may not even understand what the course graduates are doing.

"Supervisors don't understand the grid method (of diagramming the accident site)," said Sergeant Goodman. "They look at it and say 'What is this? Where's your triangulation? Get back there and do it right.' "

Captain Mitzel added, "The supervisors expect you should be done with the investigation with one trip to the scene. And they also expect a ticket to be issued in every case."

The instructors feel such problems would be eliminated if more supervisors attended the course.

"It would be rewarding for any military policeman to attend," said Sergeant Gibson. "We try to stay current on the subject of accident investigation, and so feedback is encouraged."

continued

Colo. "The course is challenging for the amount of information they put out in a short time," he said. Despite this, "the teaching atmosphere is relaxed. The instructors are very experienced."

SP4 Homer L. Brown, Ft. Buchanan, Puerto Rico, had worked as an accident investigator before the course. He said, "I thought I knew something when I got here, but I didn't know as much as I thought I did." He said the course, although short, "seemed like months."

SP4 Matthew G. den Haring, also on his way to Ft. Carson, Colo., has tried to get into the Lackland course ever since he became an accident investigator six years ago. "I've learned some new ways (of investigating) that I never thought of. All the formulas, for critical speeds, etc., were new to me. What I knew before I had learned on the job."

continued

Attendance is not limited to security police, however, The course is open to ground safety people too. One was completing the course when DRIVER visited.

"It's all of us": The instructors are not limited either. "I give them specific subjects to handle and then give them time to become really proficient with those subjects, perhaps a year," Captain Mitzel said. "Then I switch them to some of the other subjects in the course."

In this way each man is intimately familiar with the entire subject matter of course by the end of his tour of duty at Lackland. Also, at any given time, he has sufficient knowledge of his present subject to answer any student's questions fully.

The instructors work well together, in a relaxed manner that allows the exchange of ideas that makes the course improve.

"I'm very proud of this course," said Sergeant Goodman. "It's not just one person. It's all of us."

Sergeant Mincey said "This is one of the few courses where you know what the student can do when he leaves, rather than them learning it later. It's a challenging course for an instructor. The challenge is to turn someone who knows nothing about the subject into a qualified accident investigator. It is rewarding to the instructor to see the students progress."

He said he likes the course because "we deal with facts rather than opinions." A personal benefit for him is the chance to "become knowledgeable on the different branches of the service," because of the multi-service teaching staff and students.

Col Carl B. DeNisio, commander of the USAF Security Police Academy, is enthusiastic about it for that reason.

"This course is one of the best examples of tri-service cooperation to accomplish a mission," he said. "It shows how the services can work together and generate tremendous economic savings, rather than each service doing their own course."

He also praises the course for what it does for the graduates. "The course builds the level of confidence, self-worth and dignity of the students. It gives them both the technical skill and the belief they can accomplish the job, the sense of confidence in their ability. In their course critiques, the police say this is the best course they've ever taken."

He said the course is not easy to get into, and "We're making the qualifications for entry even higher."

Those interested in the course, or who have questions the staff may be able to answer, can contact the instructors at:

3280th Technical Training School
82/TTMSTM — Stop 51
Lackland AFB, Texas 78236
Or at AUTOVON 473-2385 or 3211.

TSgt Rufus Mincey (left) helps GySgt Isaac Goodman demonstrate the use of the Intoxilyzer to the class. His test was negative, by the way.

extracurricular services

EXTRACURRICULAR SERVICES
Although teaching the Traffic Management and Accident Investigation Course is their main responsibility, the instructors have been involved in a variety of related work.

Gunnery Sgt Isaac Goodman is a certified government expert witness who has appeared in that capacity at several courts martial and Article 32 hearings dealing with accidents.

Another outside activity for the course instructors was a two-day seminar on speed formulas and scale diagrams at Ft. Hood, Texas. They will also run a three-day course in traffic accident investigation to rangers from the LBJ National Park.

The instructors also assisted the 1979 and 1980 Military Pentathlon Committees by doing the required testing of international competitors for use of alcohol.

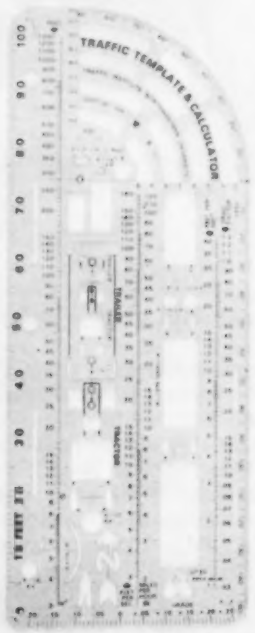
The cost of such temporary duty assignments does not come out of course funds. The individual commands requesting the services of the course instructors must pay the costs.

The course instructors receive frequent requests for information on some technical aspect of accident investigation. They normally can answer the questions right away, but if not they refer the questioners to other sources for the information.

They have responded to general requests for advice on investigations and questions on policy

The Breathalyzer is one of the most common alcohol-testing devices used by law enforcement agencies.

These are some of the texts and equipment used by the students in the accident investigation course.



(left)
The Traffic Template and Calculator, copyrighted by Northwestern University, is a key tool of accident investigation.

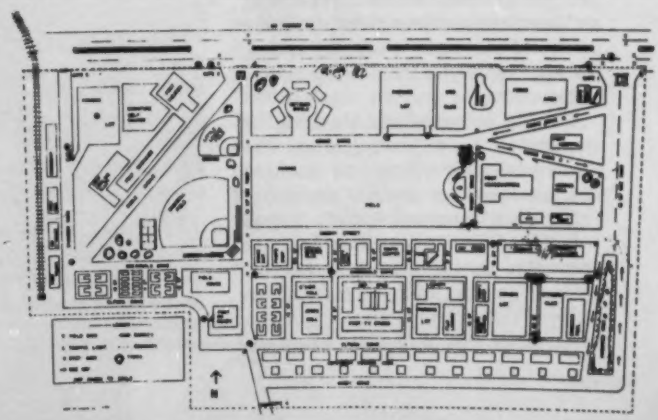
(right)
SP4 Homer L. Brown, Ft. Buchanan, Puerto Rico, intends to make good use of his class notes when he returns to his job in accident investigation.

(below)
SrA Jose Fuentes, Sheppard AFB, Texas, and SSgt Arthur LeBrane, England AFB, La., mark a spot map of a fictitious military base with sites of accidents in a classroom exercise on traffic management.

(below)
"Fort Traffic-Bog" is the fictitious site for classroom work in traffic management. The students develop strategies to combat the accident problem.

and procedure on traffic studies. They also get many questions on computations of speed, drag factor and other mathematical problems, and on headlamp examination.

The instructors welcome these questions. They are glad to be able to provide their expertise to investigators working in the field. Anyone with questions relating to traffic accident investigation is encouraged to contact the staff at AV 473-2385 or 3211.



BicYCLEs come of AGE

by TSgt JIM HOLLAND
Gunter AFS, Ala.

USAF photos
by Capt MARK GREENLEY

With the high price of gasoline and the increased interest in physical fitness, bicycles are being seen as an attractive alternative to cars as personal transportation. This increasing use of bicycles by adults for commuting to and from work has given rise to an additional traffic safety problem.

To iron out one major misconception about bicycles, let everyone understand that they are vehicles and must obey the same traffic laws as motorcycles and other motor vehicles — such as traveling with the traffic and not against it.

However, staying alive on a two-wheeler while following the traffic laws is another thing. These safe riding tips are from 2nd Lt Huet C. Landry of the Air Force Data Systems Design Center Office of ADPS Management. Lieutenant Landry is considered to be one of the best bicycling authorities in the area by the safety folks at Maxwell AFB, Ala.

In the first place, because your visibility is low compared to a car, you must drive defensively. Listen for traffic behind you and look over your left shoulder frequently.

Intersections pose a particular danger to cyclists because car drivers are watching specifically for other cars. The more crowded the traffic is, the further from the road shoulder you should ride. When approaching an intersection, move out into the center of the lane — take up space. This prevents you from being cut off at the corner.

Landry recommends standing up to pedal across the intersection. The movement and change of position catches the other drivers' attention.

Signaling intention is very important. Hand signals are a must because they also catch the other drivers' eyes. In a recent study by researchers at New York State University, it was discovered that motorists often derive more information about a bicyclist's intentions from informal body signals, such as looking over the shoulder, than they do from hand signals. Oddly enough, 20 to 35 percent of motorists in the study misinterpreted at least one of the hand signals but they did *see* the biker because of them.

Proper bicycle fit, such as adjusting the seat to allow a slight bend in the knees at the bottom of each pedal stroke, keeps you from stretching too far.

Since being seen is the safest way to travel, this person came prepared with lights, flags, and reflective clothing.

An area of bike safety that is seldom stressed is fitting the bicycle to the rider. Make sure that you can comfortably stand flatfooted while straddling the crossbar. One-and-a-half to two inches of clearance between you and the bar is good. Adjust the seat height so that at the bottom of a pedal stroke you're not overextending your leg or foot. Also, pedal with the ball of the foot as much as possible to get the most power in the stroke and cause the least strain to the legs.

Lieutenant Landry recommends mirrors for all bicyclists. There's a wide variety to choose from and it is important that you find one to fit your needs. The best types are the wrist-mounted and eyeglass- and helmet-

(left to right)
Niepce's céléripède, 1816
MacMillan's hobbyhorse, 1839
Michaux's Vélocipède, 1865
Ordinary bicycle, 1883
Rover safety bicycle, 1885

Today's road bike is not a child's toy anymore.

mounted mirrors because they give you the most flexibility and control.

A large percentage of bicycle safety is high visibility, and the Lieutenant is adamant in that. He advises wearing as much reflective material as you can. There are flashing strobes that you can strap to your left leg. Reflectors mounted in the wheels also are very effective.

An all-reflective material was introduced a few years ago. During the day it looks like ordinary clothing, but at night it reflects any beam of light, making your body completely visible. (These garments, also good for joggers, are available from many manufacturers such as Sears, Catalina, Weathervane, Jads Company and Bill Rodgers. Trims and fabrics are made reflective by the 3M "Scotch-lite" process. See February 1980 DRIVER.)

Look for bicycle helmets that protect the top of the head and the area behind the ears. These are the spots that are most prone to injury. Gloves with leather palms are hand savers in a fall, and glasses that fit well and don't slip down are valuable, especially to prevent bugs and sand from getting in your eyes. This equipment should be considered if you commute to work on a bike.

Lieutenant Landry's credentials add strength to what he says. He holds a family membership in the League of American Wheelmen, the oldest bicycle club in America, and is licensed by the United States Cycling Federation as an amateur bike racer. He has been racing for four years.

BicYCLE commuters

When we dropped a few lines in the March DRIVER asking anyone in the readership who commuted by bicycle to share their experiences with us, we weren't sure we'd hear from a single person. But six weeks later we had a file folder full of terrific responses. There are service members bicycling back and forth to work in all kinds of climates and under all manner of conditions. The average commuting distance for those who responded is between seven and eight

continued

Signal well before turning to allow the driver following you time to react.

bicycle commuters

continued

Staying in the center of the lane provides better protection and visibility.

miles one way, and several ride as far as 16 miles.

Most of our riders have been at it for years, although 2d Lt Ronald L. Latreille of Pease AFB had been bike commuting for only six weeks when he wrote us.

Why do they do it? Everyone mentioned economy (savings not only in gasoline but in car maintenance, insurance premiums, tire wear, etc.). The clear winner in economy is 2d Lt Jeffrey W. Bowyer, Offutt AFB, whose total transportation expenses for 1980 were $234! Bowyer hasn't owned a car for the past seven years. He typically gets from here to there by way of the van pool, public transportation, his feet, and his bicycle.

Of course, everyone also mentioned physical fitness. Lt Col Phillip L. Eckman, Fort Lee, Va., says "Fitness is part of being a soldier! Maintaining that fitness becomes more difficult with age and increasing assignments to staff. Bicycle commuting has become the basis of my fitness program."

Sgt Kenneth D. Rupkolvis, Ft. Carson, Colo., whose daily commute takes about 21 minutes, dropped his weight from 229 pounds in July 1980 to 190 this past March, a fact that pleases him about as much as the 50% reduction in his monthly gas bill.

But the commuters had other reasons for taking that twice-a-day spin. Says Lt Bowyer, "So much of life is fast-paced, it is quite comforting and renewing to have one everyday activity that is slow-paced." Captain Kathleen V. Davis, March AFB, mentions the feeling of leisure, smelling orange blossoms and hearing birds. And Col Eckman says, "I get schmaltzy over rainbows, snowflakes, a deer highlighted by the rising sun, the first dogwood blossoms . . ."

In general, our riders feel the morning ride improves their alertness when they get to work, and gives them a chance to unwind on the way home. SSgt F.H. Wagner IV, Edwards AFB, says he actually saves time using his bike in connection with his job. "I am able to go through flightline pedestrian gates and ride right up to doors and actually get places faster on a bike than I would by driving and using parking lots and walking."

What kind of bikes do the commuters ride? All of them agree that commuting requires a sturdy bicycle (no lightweight racers) that fits the rider, and a set of gear ratios that match the riding conditions. SSgt Wagner points out that 3 and 5 speeds have chainguards to keep trouser legs clean — 10, 12 and 15 speeds don't and "putting elastic bands over your ankles or tucking your trousers into your socks is too much hassle for the number of times I'm on and off the bike in the course of a day."

Of course, most of our riders use the bike only for commuting and wear special clothes, changing into uniform after reaching work. One or two have the luxury of a shower at the office, but most apparently do what Lt Col Mike Anderberg, Patrick AFB, does: "After arriving I wipe off with paper towels and apply deodorant."

The only weather condition most riders avoid is heavy rain, not only because of braking problems with wet rims but also because it is so uncomfortable. Lt Col Anderberg says he has solved the rainy-weather braking problem. "In wet weather the stopping power of caliper brakes on chrome-plated steel rims is nearly zero. But my new bike has aluminum alloy rims. The effect is amazing. I find it hard to tell the difference in braking effectiveness between wet and dry conditions. Absolutely superior!"

Completely disdainful of the weather is MSgt Norman E. Hooben who commutes in Germany (Rhein-Main) and rides to work daily, no matter what — including snow!

Lt Col Gerald H. Sherrill of Edwards AFB says, "I do not ride at night. No matter what lighting system one has, I feel the speed differential is excessive for a safe mixture of automobiles and bicycles at night."

In our invitation to write to us, we asked the bike commuters to tell us about the problems they encountered. Virtually everyone put wind at the top of the list. Lt Col Sherrill says the biggest annoyance in the desert (Edwards AFB) is the afternoon winds which can exceed 35 knots. "More than once, I've flagged down a pickup truck going my way home. If there are more than one of you caught in a headwind, take turns 'drafting' on the leader to save considerable energy. Take turns being leader, though." However, Maj Richard W. Shuey, Scott AFB, says he thinks wind is mostly a psychological problem, and that one mustn't get disheartened about cranking along in low gear at half normal cruising speed.

The other problem most everyone mentioned was stuff on the road to cause tire trouble — glass or stickers, primarily. Lt Col Anderberg has solved the stickers problem. He says, "We have a lot of 'goat heads' around here that can puncture tires. My old recipe was to buy heavy-duty, puncture-resistant tubes and add a package of tire sealer. But my new bike has the European-style 'presto' valves; I would have to change tubes and drill a bigger hole in the rim to handle the kind of valve common in the U.S. The bike dealer recommended a 'sticker flicker' or 'tire saver,' a wire device that rubs lightly on the tire and knocks off the stickers before they

have a chance to be driven into the tube. In three months I have gone without a flat, or even a slow leak. The other three bikes at my house use the heavy tubes and tire sealer; all of them need pumping up once a week." Captain Davis says she finds teflon tire tube liners prevent flats from glass.

So far as protective equipment is concerned, we find that the amount used increases with the number of years the commuter has been riding. Most frequently mentioned were helmets and the small mirrors that fasten to the helmet or to spectacles or sun glasses. Reflective tape and clothing plus lights of all kinds, including flashing strobes, were specified by many.

DRIVER is always impressed by the mail from bicyclists. They are a breed apart — thoughtful, safety-conscious, concerned for the environment and for energy conservation, and so enthusiastic that they are eager to convert others. We wish we had room to print every word of every letter we received, but we must settle for the following excerpts, chosen to say the most about the thing we are most interested in — safety:

Maj RICHARD W. SHUEY
Scott AFB

I have been biking to work off and on for about eight years, at several different bases. My current route is about seven miles over relatively flat land. The route includes suburban streets, two-lane highways with no shoulder and four-lane roads with shoulders . . .

Like other riders, I am sensitive to the weight of each piece of equipment. The generator cuts down cruising speed when used but is preferable to carrying around and replacing dry cell batteries for lights. I make liberal use of reflective tape. Over the years I have acquired successively more expensive — and more protective — helmets. Recently I added a clip-on mirror to the helmet. Like the seat belt in a car, safety glasses in the shop, or any other piece of protective equipment, once I have overcome the initial cumbersomeness I feel naked without the added protection.

Capt TERRENCE D. LAKIN
Mather AFB

I have been riding my bicycle to work for the past five years to conserve energy, save on commuting costs, and keep in shape. I have pedaled through the winds of Kansas, the hills of central Missouri, and the sun in California. Presently I bicycle just under four miles to work. I use a back gate, even though it is almost a mile longer, because the traffic is less congested than through the main gate. I save about $340 each year by bicycling. Couple this with the free work-out I get each morning and evening and it's easy to see why bicycling is hard to pass up.

LCDR DOUGLAS M. DIXON,
Norfolk

In May 1978 we moved to Virginia Beach and bought a house six miles from where I work at the Naval Amphibious Base, Little Creek. At that time I wanted to ride my bike to work, as I had done so several years previously when we lived on the base where I was working. However, in this new situation six miles and heavy traffic was an initial deterrent to bike riding to Little Creek.

Then came the long gas lines of 1979. With a bit of exploring I found that by taking a slightly circuitous route of about 6½ miles, I could ride through residential areas and avoid the heavy traffic completely.

So on June 1, 1979, I began pedaling those easy and thoroughly enjoyable 35 minutes twice each day. I wouldn't go back to car commuting for anything . . . The most valuable device for safe biking is a good rearview mirror. I find it indispensable for being aware of overtaking vehicles, as all the streets I commute on are two lanes.

The pleasure of bicycle commuting are those 70 minutes of exercise each day and the satisfaction of making a significant contribution to energy conservation.

Lt Col MIKE ANDERBERG
Patrick AFB

Since starting this in July 1979, I have progressed from a 3-speed, through a hand-me-down 10-speed, and now to a fine Peugeot 12-speed my wife presented as a Christmas present . . .

I have had several close calls with drivers who are not looking for bicyclists, and one instance where we collided and I ended up sliding across the hood of the car on my back. I am rather safety conscious as a result. My bike has had a flag for years and I started wearing a Bell helmet *whenever* I ride. I now assume that cars do not see me and take full responsibility for avoiding accidents.

We have four bike riders in our household. I installed generators, headlights and taillights on all our bikes. They took an enormous amount of maintenance. The light always seemed out of commission when it was needed. Now I swear by the 70¢ bracket that bolts on the handlebars and holds a flashlight . . . I tried various mirror schemes. The best in my opinion is one that screws into the end of the handlebar, costing about $4.

continued

What bicycle? Where? This is a good example of why you shouldn't ride on the wrong side of the road.

continued

SSgt FREDERICK H. WAGNER IV
Edwards AFB

Don't plan on commuting for very long on a cheap BX bike (or any cheap bike). They're designed for kids to ride to school and abuse and get stolen and just don't hold up to daily pounding and adult weight.

Get a bike that fits you — a tall enough frame, a long or short enough frame, a comfortable seat, a set of gear ratios that match your conditions, and spend the money to keep it up. A cheap bike is worse than a cheap pair of shoes.

Learn how to maintain your bike — several books are available and the work isn't really that difficult, though you may have to spend a few dollars on special tools to fit your particular bike.

If you have a lot of high winds and steep hills, consider an assist motor. You use it only when you need it, so the application is far different from a moped. I use a 2-cycle gas model, and it is good where you have long stretches with infrequent stops. For multi-stop riding — heavy traffic, lots of traffic signals, the electric-assist motor would be much better.

Consumer Reports is not too knowledgeable on bikes. Go to a good bike shop and describe the riding you'll be doing and the road conditions you'll be facing. Be prepared to spend $200 or $250. More money than that will get an extra light bike which is set up for long-distance racing or touring on very smooth roads, but which will not hold up under severe use, cost more to repair, and be a prime target for thieves. Above all, get a good lock with a key, not a combination.

Move out into the center of the lane when approaching an intersection . . .

. . . to avoid being crowded at the corner.

Sgt KENNETH D. RUPKALVIS
Ft. Carson

My route is 6.8 miles one way on city streets, four-lane highway with moderate hills and heavy traffic. But my weekly average is 120 miles because of errand running and sport riding in addition to commuting.

The equipment I use is the Schwinn Voyager 11.8 kilo 12-speed touring bicycle. I outfit it with tire pump, water bottle, front pack, and a generator light outfit. The front rack is large enough to enable me to carry most everything I need and some emergency equipment like a patch kit.

I also use a helmet, rearview mirror, and high-visibility clothing. My usual clothes are bicycling shorts, shirts, and regular touring shoes. For cool weather and cold, I dress in light layers. The colder the weather, the more layers. In wet weather, I use a water-repellant windbreaker. In very cold weather I wear a balaklava, silk side mask, under my helmet, which keeps me warm but not sweaty. Also, sport goggles help to keep my eyes from going shut in cold weather.

The Ft. Carson, Colorado Springs area is quite suited to bicycle commuting. The city offers an area access bicycle map showing through-city, marked routes. I find area motorists most courteous and cooperative, which aids in making cycling pleasurable.

MSgt NORMAN E. HOOBEN
Rhein-Main

A problem that could result in serious injury occurs when one is pedaling at the same rate of speed as the traffic (about 15 to 20 mph) and a parked car suddenly pulls partially out and cuts your breathing room between it and that moving car or truck on your left down to a "whoooo!" I once almost jumped into the bed of a pickup truck in one of those tight squeezes. Also, one needs extremely good brakes when this problem is slightly reversed. When traveling in the above manner and the vehicle in front of the one next to you suddenly turns into that empty parking space — watch out!

In Germany there are bicycle paths just about everywhere. And whereas I have driven by many picturesque areas but could not find a place to park the car, the bicycle has made it easy to enjoy such areas and at least be able to photograph them without the guy behind me beeping his horn.

Lt Col PHILIP L. ECKMAN
Fort Lee

Attaining confidence in traffic is the most difficult bicycling skill to master. I have adopted the "Effective Cycling" techniques espoused by John Forester and taught by the League of American Wheelmen . . .

This fall was staged, but the helmet and gloves will protect the rider's head and . . .

bicycles

It is important not to be cowed by motor vehicle drivers. In the Commonwealth of Virginia, bicyclists enjoy the same rights and duties as motorists. With that right, a cyclist should ride on the roadway and not skid around on the gravel shoulders or in sandy, trashy gutters. He will thereby maintain better control of his machine. While being an aggressive bicyclist contributes to efficient riding, he must be alert for the motorist who is unaware of the law, or fails to judge the closing speed of a person on a bicycle (15 to 20+ mph) . . .

After returning from Europe, I bought a helmet and wear it faithfully. Europeans do not wear helmets except for racing. With universal bicycle education, enforcement of traffic laws, including ticketing/fining errant cyclists, and the inclusion of the bicycle as a factor in road planning and design, there seems to be less need. In the U.S., motorists are not as knowledgeable of the proper conduct of bicyclists nor are many people who ride bicycles; therefore I am wary. Also, wearing a helmet seems to identify the wearer as a serious (i.e., knowledgeable, predictable) biker. For night riding I wear a reflective vest and I always wear cycling gloves.

The eyeglass mirror (protruding from the rider's head) affords the best rear visibility.

. . . his hands.

Lt Col GERALD H. SHERRILL, Edwards AFB

Since 1965, I have routinely commuted to work on bicycles of many varieties (a used $5 "special" to an expensive French 10-speed) in all sorts of locations (western desert, U.S. Midwest, and Asia).

Temperature poses no problem, and I ride in temperatures from the low 20s to 115° F plus. At temperatures much below 40 I usually wear a ski mask . . . Rain does pose a problem to commuting and I usually avoid it. I do occasionally use a foul weather slicker but it causes excessive perspiration — a factor not promoting closeness at the workplace!

I always use an MSR bicycling helmet . . . I personally know of severe injuries or deaths of bicyclists from head injuries due to encounters with automobiles and dogs. I also use a little rearview mirror that attaches to my spectacles or sunglasses. These are available at any good bike shop and are invaluable in detecting cars closing from 6 o'clock. Don't buy the motorcycle-type mirrors that attach to the handlebars; they are too heavy and are not suited to the changing body positions a cyclist must use.

2d Lt JEFFREY W. BOWYER, Offutt AFB

I have several suggestions for anyone interested in bicycle commuting.

- Buy a 3-speed bicycle. This allows a sufficient variety of gear ratios to make climbing hills easy and prevents your feet getting ahead of the pedals when you pick up speed. 3-speeds are simpler than 10-speeds and easier/less costly to repair. They are also sturdier than 10-speeds and their lower tire pressure results in fewer flat tires.
- Buy saddle baskets for the rear. These have sufficient capacity and do not hamper steering as does a front-mounted basket.
- Buy a front and rear light set with generator. Reflectors do not provide enough visibility and protection for night or rainy day riding.
- Ride defensively. As with motorcycles, some automobile drivers selectively eliminate bicycles from their field of vision. Even if you have the right of way, make sure you get some acknowledgement from automobile drivers before crossing their path. Better yet, allow the car to proceed first.
- Secure your right pant leg. Otherwise, this has a tendency to get drawn between the chain and front gear and seldom is removed without tears or permanent grease stains.

2d Lt RONALD L. LATREILLE Pease AFB

I purchased two quality bikes (one for my wife) that I thought would be a pleasure to ride rather than burdensome. I've been riding approximately six weeks and I cover six miles a day commuting. I do admit that I'm a fair-weather rider. I ride when it is cold and windy but I park it when it's raining or snowing. There are two routes I can take to work: one is hilly over a narrow road, the other is flat over a wide road. I almost always choose the latter. I don't use any protective clothing; rather, I ride defensively at all times.

Capt KATHLEEN V. DAVIS March AFB

Heavy traffic is a problem. I try to think like a car driver and be aware of my visibility. Other vehicles obscure a bicycle, parked cars are always a hazard, and narrow turns drastically reduce one's visibility to cars. On city streets I ride with traffic as much as possible, using left-turn lanes and hand signals. I am very aggressive and will move in front of cars, traveling in their lane if they're moving slowly (up to 30 mph) . . .

Important safety precautions include crossing railroad tracks at right angles, even if you have to swerve (carefully) to do it. Narrow tires slip sideways and get caught in rails. Also, avoid gravel and sand. Bikes skid on them.

CDR H.W. PAUL Offutt AFB

You should approach your bicycle in the same frame of mind that you approach a motorcycle. Your bicycle should fit you. It should be equipped with mirrors so you can be aware of overtaking traffic.

continued

bicycles continued

You should wear protective head gear, glasses or other eye protection, and clothing that fits in such a manner that it will not become entangled in moving parts. I have a friend who was wearing a long scarf around her neck. It became entangled in the front wheel. The resultant accident placed her in the hospital for extensive facial surgery.

You should also approach cycling like you approach jogging on/near public roads. You must be seen. There are several ways to go about this: the pole and flag; reflectors; lights (remember if you are using a generator that the lights dim as you slow and are out at stops); battery operated strobe light; reflective clothing.

Do not take your bicycle into traffic until you are totally familiar with its operation and handling and you are in good physical condition. You should be able to maintain a speed of 20 to 25 mph on level ground. Ride defensively! Be aware of everything around you. Always give yourself a route of escape. Never let yourself be surprised. Never assume you know what a driver or pedestrian is going to do. Never assume the driver knows what you are going to do. You are very vulnerable!

2d Lt ROBERT E. BULLOCK
Shaw AFB

Since arriving at Shaw in January I have been commuting 18 miles each day. As I ride on a moderately busy, four-lane highway, my primary concern is traffic. To promote safe riding, I do the following: wear reflective ankle tapes, reflective vest, ride with a reflective flag which sticks out to the side encouraging motor vehicles to stay wide, wear a "shorty" motorcycle helmet, stay to the extreme right of the wide shoulders, do not ride in rain or after dark, use hand signals at all turns, but — most of all — I ride defensively.

1st Lt KERRY LEDFORD
Tinker AFB

I ride my bike to work virtually every duty day and have since 1973. I have been stationed at Altus, Sheppard, Keesler, and now at Tinker . . .

I have not had to deal with steep hills, but as for traffic and narrow streets I find that the best practice is to stay at the right edge of the street and yield to cars, of course. I have never had an accident or mishap during my thousands of miles of bicycling. I attribute this partly to alert, defensive bicycling and partly to good fortune.

The only gadget I have found useful is a saddle-bag type wire basket which allows me to carry my racquetball equipment back and forth, and even pick up a few groceries on my way home. I wear no protective gear, just my uniform. I ride through light rain, snow, sleet, strong winds, and on snow-covered or icy streets. A loyal and determined bicyclist is not always a safe one.

TSgt CHARLES F. EVEY
Columbus

I have a cheap bicycle I bought (at a discount store) — a 10-speed. I've added a set of lights, rearview mirror, and a speedometer. Why do I do it? Even when my family laughs at me, an "old man (40) on a bicycle"? Well, a couple of years ago I decided it would be good transportation to and from work and when I'm cross-country. Also I need the exercise and it's good at the gas pump.

(My route) is about 10 miles one way, roadway is everything from very narrow to four-lane divided, speed limits from 25 to 55 mph. A good variety of terrain, from climbing overpasses to straightaway.

Coping with rain? I get wet. But here in Ohio, I ride only in the summer. The weather I have trouble with is wind. The only problem I have besides wind is drivers not giving me room. I only need two feet.

Capt MITCHELL D. STUCKER
Nellis AFB

Danger is a subjective thing. The idea of rating a part (such as an intersection) or a section (percentage) of the route as dangerous relates directly to the cyclist's hesitation to commute. For myself, there is one dangerous intersection and a section of about half a mile that is also dangerous and I cannot avoid either. I always use a helmet, rear reflector, pedal reflectors, cycling gloves and elastic on the pant cuffs. I have available for reduced visibility conditions a headlight, yellow blinking taillight, blinking leg band, and the standard triangle reflector that indicates a slow-moving vehicle. (One advantage to bicycling) is ease of maintenance. How many people can sit in their family room and completely overhaul their car on a Saturday?

COMMENT: In your April 1981 Double Tech you did your readers a disservice when you presented a formula for determining the mileage necessary to recover the cost of fuel-saving modifications. Your formula, cost times old miles per gallon (mpg) times new mpg, is only the numerator and neglects fuel price and mileage differential. Your formula indicates that fewer miles are required to recover a one mpg increase than a five mpg increase. The correct formula is cost times old mpg times new mpg *divided* by the price per gallon times the increase in mileage (new mpg minus old mpg).

REPLY: You're right and we would have been too had not the gremlins in the printing plant dropped two lines of type. It is interesting to note that a new set of spark plugs which usually increases mileage 3.44 percent can be paid for in 2,500 miles and a complete tune-up (providing an 11.36 percent increase) in 7,000 miles.

COMMENT: In the February 1981 issue you mentioned water injection as a possible cure for "ping." Aren't there also other beneficial side-effects besides this? Detrimental effects? If this could increase my mileage and/or engine life, I'm all for it!!! While on the subject of injection systems, can you give me any info on nitrous oxide and alcohol injection?

REPLY: Water injection may provide a bit more horsepower or fuel economy, but that'll depend on your driving habits. Any of the side effects that cooling the fuel charge provides are a direct result of knocking down the "ping." As for detrimental, the excess moisture might — and only just might — cut the life of exhaust components. Alcohol injection is pretty much the same as water injection except that alcohol costs about $1.50 a gallon. As for nitrous oxide injection, it is a quick way to lunch an engine. The massive increase in horsepower produced with NO injection is more than any but the best-built racing engine can stand.

tteecc!!!
DOUBLE TECH
Q A

With TSgt RON LATHROP

COMMENT: I've noticed a few of my friends with home-made "tunnel rams" fitted between the carb and air cleaner, about two-to-four inches in height. Are these so-called "rams" of any benefit in terms of mileage and/or performance? Or are they just toys for appearance only?

REPLY: The engineering necessary to design and develop a working ram system taxes most major manufacturers to their limits. Therefore, what your friends have fabricated (discounting pure luck) are probably just toys. In addition to completely upsetting a well-engineered system, ruining what horsepower and economy they had, they probably now have driveability problems with their machines, especially when the engines are cold.

COMMENT: I'd like to recommend several items that would help other readers improve fuel economy. They are: porous foam air filters; gas treatments, carburetor treatments and carburetor cleaners; copper or brass core spark plugs; "turbo" mufflers; and capacity discharge ignitions.

REPLY: I think you'd better use the formula elsewhere in this Double Tech.

While porous foam air filters are not as restrictive as paper element types, most modern engines are designed around a very specific air flow. To change this flow completely upsets the carburetor balance and may actually hurt fuel economy.

Pour-in carburetor cleaners don't do enough cleaning to justify their cost, regardless of what improvements the manufacturer claims. Exterior cleaners are good for keeping the carburetor functioning properly between rebuilds.

Copper and brass core spark plugs provide no noticeable advantage in regard to fuel economy, emission reduction or increased acceleration when compared with conventional plugs. In fact, the plug recommended by the manufacturer usually has a slight advantage.

"Turbo" mufflers might pay off provided you need a new muffler anyway. However, human nature is going to offset this pay off. When people hear their engine purr through a less restrictive muffler they tend to want to use the power they hear. Once the foot goes down on the gas pedal, all the efforts to save fuel get sucked out the exhaust.

Now, capacity discharge ignitions are great, but the recovery miles are far too long.

COMMENT: I want to put wider wheels and tires on my front-wheel-drive car, but everybody keeps telling me I have to buy special wheels for front-wheel-drive only. What's the difference?

REPLY: Everybody is right. You do have to fit wheels specifically intended for front-wheel-drive. Front-wheel-drive suspensions are designed with a healthy amount of positive offset to reduce torque steer. (Torque steer is the tendency of the drive wheels to cause the car to turn when accelerating.)

Now negative offset wheels look "tough" because they make the distance between the wheels (track) wider. But on a front-wheel-drive car they'll kill you. Negative offset wheels move the load center outboard, and front suspension wear becomes very rapid. Additionally, on everything but the smoothest, straightest road front-wheel-drive cars dart about dangerously on negative offset wheels. And when accelerating hard or braking at the same time you are turning, negative offset wheels on front-wheel-drive cars will be the death of you.

COMMENT: I've done everything I can think of, but still can't get rid of the vibration in the steering wheel of my front-wheel-drive car at high speeds. Help!!!

REPLY: Front-wheel-drive cars are very touchy about tire/wheel balance. Extra careful, high-speed spin balancing of each tire/wheel combination is a must. Next make sure the steering rack is snug. After that, install a steering damper. Outside of that, all that can be done is adding caster and toe-in. Unfortunately, most front-wheel-drive cars also have MacPherson strut fronts without caster adjustment. The best solution I have is to slow down and observe the national speed limit. The type of vibration you are talking about is probably more annoying than dangerous at 55.

COMMENT: I've seen some pretty big tires on cars lately. Aren't they dangerous?

REPLY: I like large tires. Because they put so much more rubber on the road they improve braking. They also steady cornering and soften the ride. A good $100 high-performance street tire is just about the same as the rain tire on racing cars at LeMans. The aggressive tread pattern and compound combine to deliver exceptional dry traction as well as wet handling and braking. In fact, some perform the same regardless of whether the road is wet or dry . . . up to hydroplaning speed, that is.

EDITOR'S NOTE: Double Tech discusses general interest automotive comments and questions. When sending questions and comments to Double Tech, be sure to include all available information which will help in finding the correct solution. If you have a question you'd like answered, and feel others could use the knowledge also, send it to:

HQ AFISC/SEDD
Double Tech
Norton AFB, CA 92409

ON THE road again...

A car that is in tip-top running condition is essential to safety. If your car doesn't move, turn and stop when you want it to, you can be involved in an accident.

For example, you're behind the wheel of Plimpton (I name my cars, don't you?), motoring along at a brisk pace on the open highway. Suddenly the entire car shudders and the engine stalls. It just quits. I shouldn't have to tell you how frightening that can be. And it is also very dangerous. This is especially true if there is a big 18-wheeler pressing against the rear bumper of your mini-car at the time.

However, once you've gotten safely off the road your main concern is with getting back on again. And at that point in time just looking under the hood isn't going to be much help if you don't know what you are looking at or for. And if you're miles from nowhere on a little-traveled road . . . well, you should have the picture by now.

To be a safe driver you need to know about each of your car's systems — how they work, early signs of malfunction and what corrective action to take. A car-wise driver can avoid many headaches on the road, stay out of accidents, save money and get better service from repair facilities.

Your vehicle knowledge begins with reading the owner's manual. And it won't hurt to re-read it occasionally.

Right now you're taking another important step toward increasing your auto knowledge: you're reading about car care. But don't limit yourself to DRIVER. Read the car news section of your local newspaper as well as other magazine articles about auto care.

All major manufacturers have consumer information and customer service departments whose function is to make you more knowledgeable about your vehicle and its needs. Write to them for information.

You'll also want to perform more of the routine inspection and maintenance tasks yourself. This will add to your interest and knowledge and should result in your having a better maintained, and therefore safer, car.

If the engine overheats, stop in the shade if possible. Shut off all accessories, especially air conditioning. Lift the hood.

If a fan belt breaks, the engine will overheat and the alternator and air conditioner will quit. Stop to let the engine cool off (about 15 minutes), then proceed slowly to the nearest service station, stopping from time to time to cool the engine.

Check the gas gauge. If it reads "Empty," don't attempt to re-start the engine until the tank is refilled.

All this knowledge will help you if your vehicle should suddenly stop "for no reason."

Some of the basic reasons your car can suddenly stop include: an empty fuel tank, overheating, electrical failure, flooded carburetor, wet ignition, fuel system dirt, vapor lock and broken fan belt. Solutions to these problems are on these pages.

continued

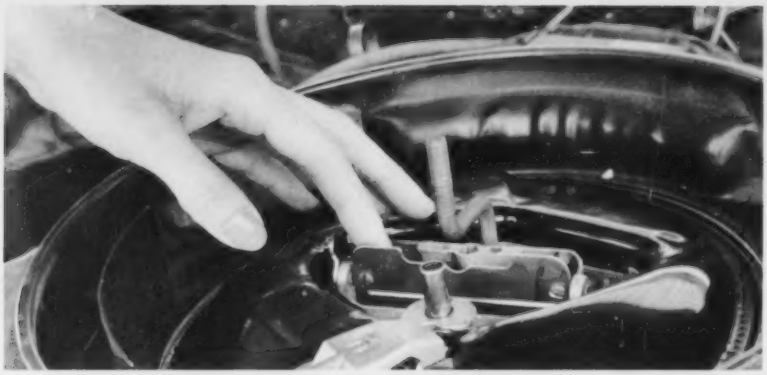
If the car is overheating, check the fan belt to make sure it is tight. Make sure the hoses aren't leaking. Then run the engine at a fast idle and turn the heater on to help dissipate engine heat.

If the temperature doesn't return to normal after a few minutes, drive slowly to the nearest service station, stopping for 15 minutes every couple of miles.

Electrical failure usually means a blown fuse or opened circuit breaker, a loose or broken wire or corroded or loose battery terminal. If everything is dead, the trouble is with the battery, battery cables or connections. Remove the cables and clean the battery terminals.

Another electrical failure problem could be cable connections to the starter and ground. Check these for tightness.

Vapor lock is the result of gas stopping the flow of fuel to the carburetor. Usually this gas is vaporized gasoline. Since it took heat to create the vapor lock, waiting for it to cool will usually solve the problem long enough to get to a service station for a more permanent cure.



Gas odor usually means a flooded engine. Remove the air filter and slip the choke open. Crank the engine with the accelerator pedal fully depressed. The engine should dry out and start. Don't drive the car without replacing the air cleaner; it also acts as a flame arrester.

(far left, near left, right)
A wet ignition system can short out, causing the engine to miss or stall. Turn off the ignition and remove the key before starting drying operations (upper right). Wipe dry the spark plug cables as well as the spark plug porcelain (far left). Use a rag to dry out the inside of the distributor cap (left). And dry off the top of the ignition coil (bottom right).

continued

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OFF THE ROAD

Getting off the road safely is your first major concern when your vehicle stalls.

On an expressway with paved shoulders, signal and pull off at near traffic speed — then slow down. Where the shoulder is unpaved, signal a right turn and slow down to a safe speed before turning off.

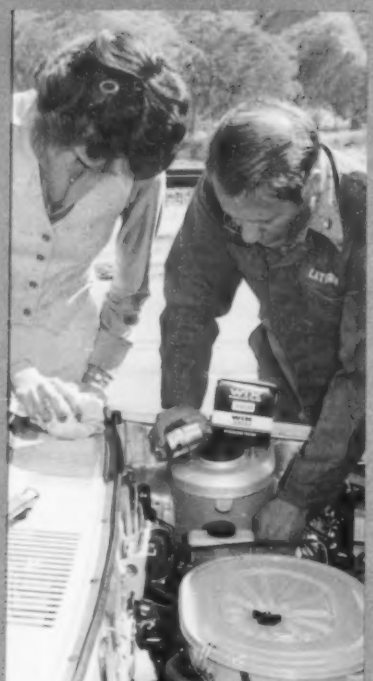
Remember, if you have power brakes, there'll be no power to help you stop when the engine is dead. You'll have to really push hard and it will take a long distance to stop. As for power steering, I hope you've been doing your pushups.

Once stopped, turn on your four-way flashers. If it's dusk, dark, night or bad weather, leave your low-beams on.

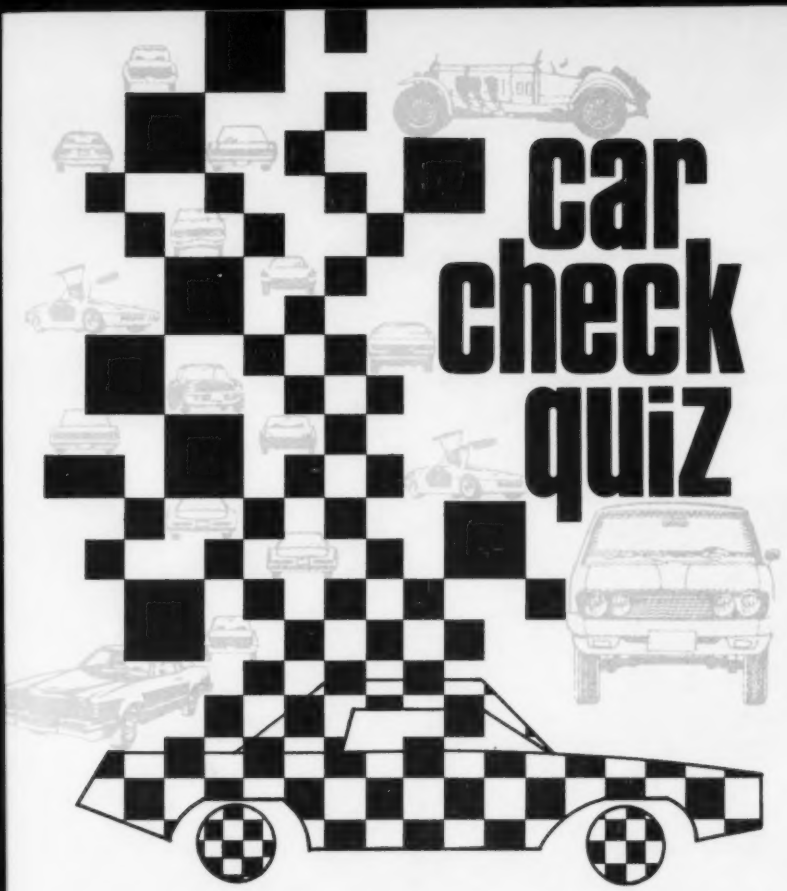
If you must stop close to a traffic lane, on a curve, over a hill or in any risky location, get everyone out of the car and well away from traffic. By all means, don't block taillights at night by standing or working behind the car.

Day or night, place a flare or other warning device about 15 feet behind the car and another at least 300 feet back (that's about 120 paces). Raise the hood and tie a white handkerchief to the antenna or traffic-side door handle as a signal if you need help.

Your car's light and electrical-accessory wiring system is not much different from your home's, and if you carry several new fuses — and know where the fuses are located — the job of handling a blown fuse is simple.



Dirt in the fuel system usually requires that the fuel filter be replaced. However, the entire system might have to be drained and cleaned including the fuel tank and carburetor. If you haven't already guessed, this probably means some roadside repairs by a service technician and/or a tow.



car check quiz

"Gas-and-go" service station patrons should be particularly aware of the importance of regular car checks. If you're among this growing motoring population, see how well you do on this quiz from Car Care Council.

1. You changed oil and filter just a few hundred miles ago and on your weekly dipstick check you discover the oil looks dirty. Most likely, the reason is:
   a. You have a faulty oil filter.
   b. This is the normal appearance of detergent-type oil.
   c. The engine has excessive combustion.

2. When traveling, tire pressure should be checked:
   a. More frequently.
   b. At the beginning and end of the trip.
   c. When tires appear to be low.

3. As a conscientious car owner, you look underneath your car occasionally for leaks and find one of the shock absorbers appears to be leaking oil. So:
   a. You replace it and keep an eye on the others.
   b. You replenish the fluid.
   c. You have new shock seals installed.

4. Power steering and brake fluid levels should be checked:
   a. Annually.
   b. Before starting a long trip.
   c. Monthly.

5. Battery connections should be checked regularly for accumulation of corrosion, which:
   a. Causes the battery to overheat.
   b. Reduces battery efficiency.
   c. Can ruin the battery plates.

If you've never done regular maintenance checks yourself and want to know how, send us a postcard with your name, military rank (any service) and address and we'll send you a reprint called "Self-Service Gas Up 'n Go" which explains it all.

ANSWERS

1. B is correct. Oil functions as a cleaning fluid as well as a lubricant inside your engine. That's why periodic oil and filter changes are essential.

2. A,B and C are all correct. Checking tire pressure is a simple chore that's more important than ever when you're on the road.

3. None are correct. A leaking shock absorber is no longer serviceable. Shocks should always be replaced in sets of two or four to ensure stable handling characteristics.

4. B and C are correct. It's easy to check these fluids. For safety's sake do it monthly.

5. B is correct. Corrosion acts like an insulator between contacting surfaces of the cable and terminal or post. Clean these connections at least once a year.

safety

Exceeding the 55 mph national speed limit on a bicycle requires that safety be high on your list of priorities. And so it is every year at the International Human Powered Speed Championships. But the machines at the Pomona, Calif., track this year weren't everyday bicycles. They were more like bullets pedaled by men and women. These streamlined enclosures that form the bullet-like exteriors triple the rider's efficiency at high speed. Plus they provide protection for the rider in case of an accident. Additionally, all the riders protected themselves with helmets.

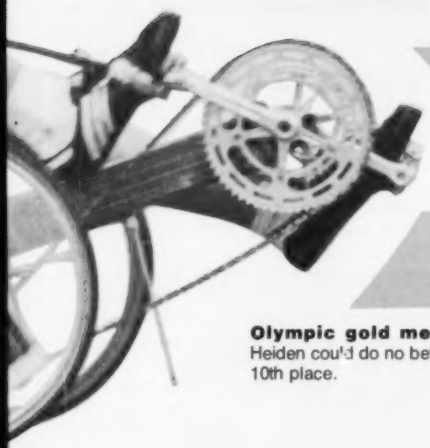
2.

3.

1.

(1, 2, 3, 4 - right and above)
Helmets used by the human power plants were as varied as the machines they pedaled.

at 55mph on a BIKE!



Olympic gold medalist skater Eric Heiden could do no better than 49.7 mph and 10th place.

Because there is very little noise to announce the approach of a human-powered machine, spectators can find themselves dangerously close to vehicles traveling at or near the national speed limit.

4.

(below)
Some riders took their protection several steps further. This one went as far as donning shoulder and elbow pads as well as wearing hockey-style shorts.

A tandem bike gets off to an early lead during the LeMans start road race, while crews continue to buckle riders into the more streamline machines. That's right, helmets *and* safety belts.

continued

continued

and the Winner is!

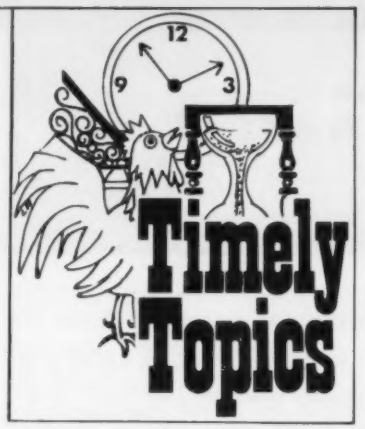
A victory salute from world speed-record-holder Dave Grylls at the finish of one of the road races. He has gone 58.64 mph over a 200-meter distance by himself in a $10,000 Vector Alpha. With Leigh Barczewski in a two-man Vector Beta, he has reached 62.92 mph.

Having just taken the lead in the electric bike race, this machine lost traction on the slick surface and tipped over. There was no real damage to either machine or rider.

The sides of this machine are evidence of a recent spill, but both the machine and rider are back in action moments after the accident.

The British entry for the road races was a tandem bike with special fairing.

Added to the competition this year was an electric bike race which had a very diverse field of machines.



NEW GAME KEEPS PEACE IN THE CAR

Remember the good old days when you could keep youngsters busy on a motoring trip counting farm animals? We're seeing fewer horses and cows today, but a new pastime has emerged to occupy the little darlings. It's called "MUFFLER WATCH": count the mufflers alongside the road.

Car Care Council takes credit for inventing the game, having observed as many as 19 mufflers on one 20-mile stretch of Interstate 94 in the Detroit area.

Counting mufflers may be fun for the kiddies, but it can be costly for the folks who lost them, says the Council. Roadside mufflers often are in perfectly good condition when they part company with the rest of the car; it's just the brackets and clamps that let go.

Economics aside, a more serious concern about mufflers falling off vehicles at highway speed is the danger to anyone traveling behind the offending vehicle. It's a very real traffic hazard.

A periodic check of the exhaust system is recommended by Car Care Council, who reminds motorists of the importance of a secure, leak-free exhaust system. The carbon monoxide in exhaust gas that can seep into the car is colorless, odorless and deadly!

Keeping exhaust system parts intact makes sense in many ways, even though such measures might put a dent in "muffler watching."

TAILGATING SIGNS

Highway officials hope to reduce the number of rear-end accidents along Interstate 270 in southern Illinois through the use of electronic signs to warn drivers who are following too closely. Overhead signs at three locations flash a warning when sensors buried in the pavement compute that the interval between cars is too short. *(Traffic Safety)*

GM RECALLS STATION WAGONS

About 80,000 intermediate station wagons are being recalled by General Motors Corp. because *rear windows may shatter or explode*. The auto maker's decision to recall immediately followed a determination by NHTSA that the problem constitutes a safety defect. Vehicles involved are 1979-80 model Buick Century, Chevrolet Malibu, Oldsmobile Cutlass, and Pontiac LeMans built during calendar year 1979. NHTSA has received about 400 reports of rear windows exploding. The incidents include two collision accidents and 15 injuries. The problem is due to a chemical reaction between the weather sealing strip and the defogger grid. The automaker denied NHTSA's charge that "the explosion can propel the glass either inward or outward." *(Highway & Vehicle/Safety Report)*

VOLKSWAGEN CALLING IN RABBITS, SCIROCCOS

About 110,000 Rabbits and Sciroccos, vintage 1977-79, are being called back to the barn by VWoA. A NHTSA Office of Defect Investigation study concluded that the cars' accelerator cables are faulty in vehicles equipped with fuel injection and automatic transmission. Also affected are some 1980 Sciroccos and Rabbits, and some Rabbits as old as the 1976 model year, all with automatic transmission. The same defect is the subject of a continuing investigation regarding some 48,000 1976-80 Dashers and some 30,000 1976-79 Audi Foxes. A different squint is being given about 96,000 1976-model Rabbits and Sciroccos with alleged carburetor problems. *(AutoWeek)*

RECALL NOTICE

In the past, Radio Shack sold a Test Lead Kit, catalog no. 270-832. This product could be dangerous. When assembled, metal is exposed which, if touched, could result in electrical shock. This product should not be used. Simply return the product to your nearest Radio Shack store for a full refund.

THE FAMOUS CRASH TESTS INFLUENCE JAPANESE

Whatever the practical limitations of the Government crash tests as consumer advice, their publicity value alone may force important safety advances. An executive of one of the major Japanese automakers told CU (Consumers Union) that, as a direct result of the poor showing of small Japanese cars and the attendant publicity, the Japanese are making a major effort to design more safety into their cars as quickly as possible. "When you look at Japanese cars a year or two from now, I'd be very surprised if they all didn't pass the crash tests," he said. "Our cars are selling very well in the current market," the executive told us, "but I think we all realize this could change. It's very unwise to have discrepancies in the crashworthiness compared to American small cars. There's no difference in technology or know-how. It's just a matter of the Japanese deciding that something has to be done, and that decision has been made."

(Consumer Reports)

CAR TRAILERING ALIVE AND WELL

The downsizing of automobiles has been followed by trailer-makers who have reduced weight by 30 to 40 percent to make them easily towable with today's smaller-engine cars, reports the Automotive Information Council (AIC).

This should come as good news to car owners who felt they might have to give up pulling a travel or camper trailer. Even boat trailers have been reduced in weight by almost a third.

Trailer-makers are using lighterweight high-strength steels for the chassis and axles and are substituting plastic for doors and compartment covers. Walls of some of the travel trailers are made of a light but strong honeycomb material. Improved aerodynamics also reduce the pulling load.

Some of today's trailers are superlight. One 25-footer weighs only 1,800 pounds, vs. 4,000 pounds a few years ago, which means the new version can be pulled by a compact car. Some 16- to 20-footers can be pulled by subcompacts.

AIC advises checking with both the car dealer and trailer dealer to get pulling capabilities and trailer weights before buying.

Trailer people express enthusiasm about today's front-wheel-drive cars. One boat dealer said he pulled a 1,000-pound boat up a steep launching ramp with no wheel spin with his front-drive compact. A trailer dealer said front-drive "provides greater control and better performance for trailering because the car is pulling the unit, which provides better tracking."

BACKfire

LETTERS to the EDITOR

MOTORCYCLE CONSPICUITY

The often heard phrase "I didn't see the cycle" can be changed to "look at that bike," if only the cycle operator makes himself obvious.

One of the best pieces of aftermarket equipment available is the "Q" Switch and the same device which is manufactured by Prestolite (if I'm not mistaken). The Q Switch pulses at a rate of 4 cycles per second. It draws your eyes to the light. Granted, you are not in the business of endorsements; however, in this case, it is well worth it.

Another area of concern is night visibility. An issue of *Rider Magazine* discussed this area and suggested the rewiring of the low beam into the high beam on your headlight. In this way, when the headlight is on high beam, the low beam is also on and gives a dual pattern which really helps.

While discussing this with a friend, he indicated that there was a mid-level point between the high and low beam selector on his Gold Wing and he was right. I tried it on my '81 Honda 750K and could light both beams at the same time. We also tried it on a Honda 750 Custom with the same results. I think that it may also work on other brands of bikes; all the people have to do is try it. The results are tremendous.

I hope these two tips might be of assistance in the prevention of motorcycle accidents.

MSgt Fred H. Fagan, USAF
APO San Francisco 96274

You're right; however, you can get a great deal more light down the road without the heavy electrical drain of both high and low beams by installing a good halogen lamp.

MACHISMO

I am writing about the Letter to the Editor in your April issue (saying the need to prove machismo is generated by the existence of females, thus females are responsible for the higher accident rate of males).

I feel that Maj J. Jeremiah Mahoney should consider this — if everything is the fault of women, so is his existence. As for the need to prove machismo, women never made that demand, men (at least some) made that assumption. There are many ways to prove machismo, if you feel the need, without causing an accident or any form of danger to anyone. Putting the blame on a woman simply because she is female is not only chauvinistic but absurd. Comments like that give EOT more work than they can handle.

I thank you for letting the other side have a rebuttal.

SSgt Pamela E. M. Krainiak, USAF
Langley AFB, VA 23665

The Editor thought Major Mahoney was just putting her on a bit!

DRIVER ARTICLE SAVES LIFE

First, I want to congratulate you on a very fine magazine. I have enjoyed this publication since I came into the service in 1969. An article in DRIVER Magazine saved my life in 1974.

Being a hot-blooded young C-141 pilot and envisioning myself to be the 60th MAWg's answer to A.J. Foyt, I became annoyed with the slower traffic and other delays to expeditious motoring. Enroute from Travis AFB to my home in Vacaville, I occasionally would have to stop at a railroad crossing for a passing train. While observing this annoyance, I discovered that the bells, lights and cross arms continued to do their job as much as 20 seconds after the caboose had passed. So I adopted the technique of simply driving around the cross arms immediately after the caboose passed by. I probably did this cute little trick three or four times prior to reading your article on the hazards of railroad crossings.

Well, within a week of reading your article, I had the distasteful experience of having to wait at that same railroad crossing again. As I watched the caboose go by, I certainly considered executing my usual maneuver but decided to wait just because I had read about the accidents that could occur. No more than two or three seconds later a train came by in the opposite direction. The train I had been waiting for had blocked my view of the second set of tracks and the other train.

Having A.J.'s skills and sense of timing would not have prevented my being broadsided by the second fast-moving train. I became very aware of what had almost happened and this has done a great deal to improve my judgment and my approach to driving. Obviously, proceeding through a railroad crossing while the warning system is still activated is taking a chance. I would not consider taking a calculated risk when flying an aircraft so why did I do it driving a car? I think the answer is training and knowledge. This is where your magazine helps by bringing to mind things that have perhaps gone unnoticed through years of bad habits.

I wonder how many lives and accidents have been saved by your article. I know at least one was . . . mine!

Maj David L. Lay, USAF
Williams AFB, AZ 85224

THREE-CYLINDER DIESEL

Maybe you could save VW some research money on new 3-cylinder diesel (Oct '80 DRIVER "Timely Topics"). The cost of developing their proposed "super-mileage Rabbit" is really questionable when one considers a standard diesel engine idles on 99.+% air!

At 32 years old, I am on my 52nd auto.

You produce a fine auto magazine.

SSG Joe Lackovich, USA
Jacksonville, FL 32005

IT'S A NO-NO

I have been an avid reader of your magazine for many years and I have been pleased to see the articles on motorcycle safety; good, solid information — except in your April 1981 issue entitled "April Dual." On page 20, a photograph shows a passenger on a motorcycle giving hand signals for the operator.

As both a motorcycle operator and as an MSF Chief Instructor of motorcycle safety, I would strongly recommend against this practice. Communications between the passenger and the operator while a motorcycle is moving are at best poor. Confusion can result in this critical task. A misunderstood or flat-out wrong signal can be disastrous.

Thanks for your time and keep up the good work.

SSgt R.A. Rendl, USMC
FPO San Francisco 96602

Oops! You're "flat-out" right.

CRUISE CONTROL

All the feedback you have published on my snow cruising article has driven me to PCS to Panama. I knew they wouldn't let me or my Chevy on base another winter in Texas.

I still have my cruise control Chevy. Give me one rainy season down here and I will tell you all about cruise control and hydroplaning.

Maybe it would get me an early DEROS.

1st Lt Richard N. Benoit, USAF
USAFSO
APO Miami 34001

Last October we printed a letter from Lt Benoit telling about a problem he had retaining control of his car when he hit a slushy patch of highway with cruise control engaged. A lot of other readers were inspired to write us about their opinions of and experiences with cruise control. We'll start a new round when Lt Benoit writes again!

THE FLIP SIDE

As a regular reader of your magazine, I would like to say that you do a fine job. The articles are usually well written and interesting.

However, I noticed while I was reading the April 1981 issue that the picture on the front cover of the young lady on the bicycle is printed backwards. I just wanted you to know that I looked at the whole cover and not just Cheryl.

Mr. R.C. Bailey, USAF
Wright-Patterson AFB, OH 45433

We wondered if anyone would notice. We did it that way for layout purposes. And thanks for the compliments.

GAS AND SPEED

Having recently been reassigned to Germany, I brought my "smogger" with me ('81 Mustang, 2.3L, Calif.-equipped, 34 highway, 23 city). The catalytic converter removal fee was a jolt, but the downfalls in performance and mpg were shocking after starting to use leaded gas. I've monitored gas use closely and have, on several occasions, stayed under 55 mph (hard to do here). Removing the belt on the air pump and switching to slightly colder plugs has increased pep substantially. Still, I'm disappointed. What lies in the future of an unleaded engine in a world of leaded gas and extended high highway speeds?

To my surprise, I've encountered many others here that share my concerns, mainly about sustained rpms in the range of 3,000 to 4,000 rpm. In essence, can American engines hack this problem here? Letters to major auto companies are widely opinionated and provide little or no info. How about it?

Enjoy your magazine tremendously.

SSgt Mark L. Wilson, USAF
APO New York 09057

You've learned a lot of very painful lessons that we have been preaching about for years:

- *The faster you go the more fuel you use.*
- *Disconnecting pollution devices that were engineered into today's cars ruins performance and mileage.*
- *Leaded fuels aren't the answer to short fuel supplies.*
- *Cars designed for 55 mph highways are disappointing when moved out of their environment.*

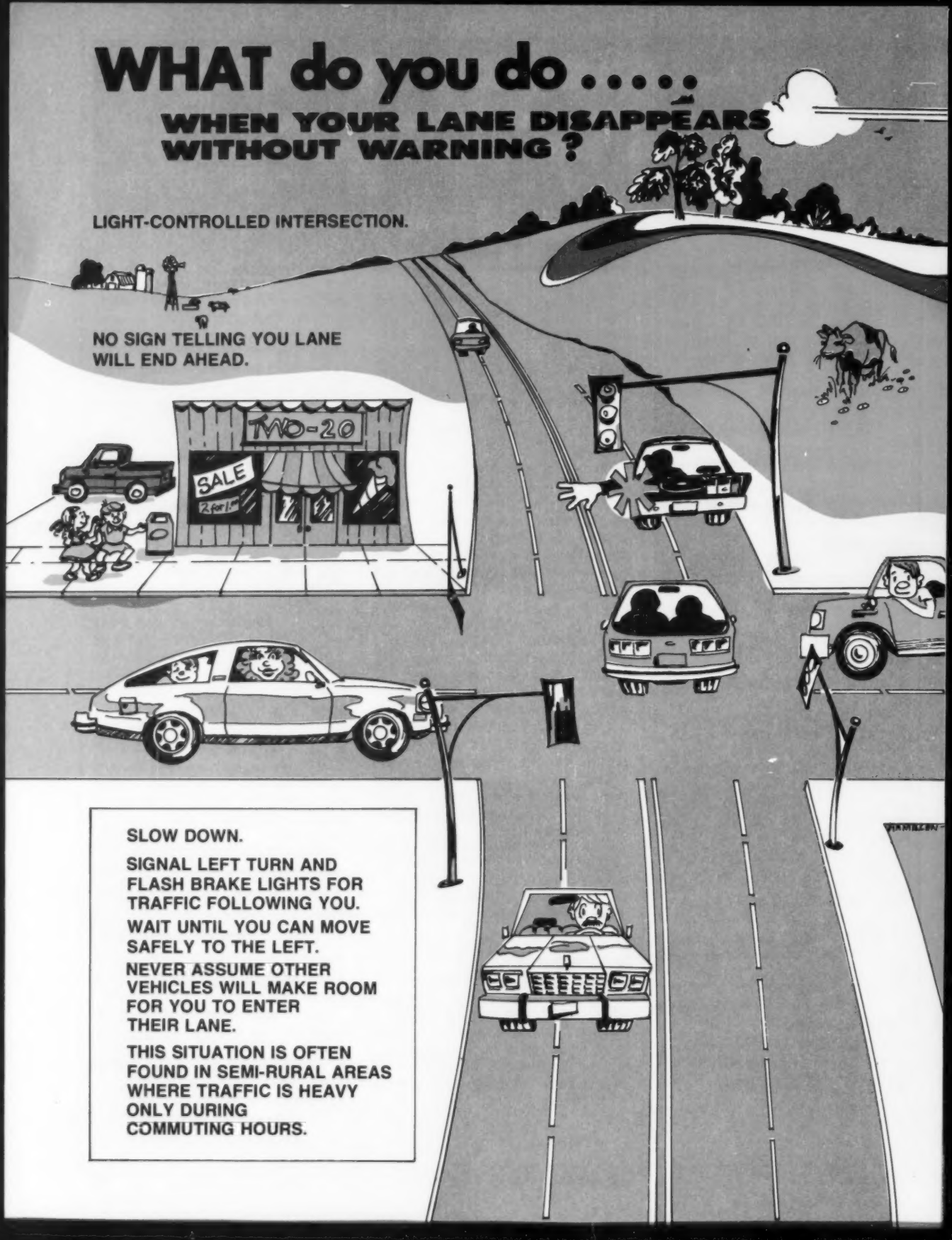
Unfortunately, we don't have any easy solutions for Americans in Europe. While American engines can "hack the program" overseas, they can't do it as economically as engines designed for those environments.

And a final word of caution: Be extremely careful not to stress 55 mph American tires by running them at Autobahn speeds. The results are deadly.

☆U.S. GOVERNMENT PRINTING OFFICE: 1981 783-022/07

WHAT do you do .....

WHEN YOUR LANE DISAPPEARS WITHOUT WARNING?



SLOW DOWN.

SIGNAL LEFT TURN AND FLASH BRAKE LIGHTS FOR TRAFFIC FOLLOWING YOU.

WAIT UNTIL YOU CAN MOVE SAFELY TO THE LEFT.

NEVER ASSUME OTHER VEHICLES WILL MAKE ROOM FOR YOU TO ENTER THEIR LANE.

THIS SITUATION IS OFTEN FOUND IN SEMI-RURAL AREAS WHERE TRAFFIC IS HEAVY ONLY DURING COMMUTING HOURS.